

Amendments to the Claims

Please substitute the following claims 1-76 as replacement claims for the previously-pending claims. In this Amendment F, claims 16, 24, 25, 33, 42 and 70 have been amended, claims 17 and 41 have been canceled, claims 71 and 72 have been withdrawn and new claims 73-76 have been added.

## Claims 1-15. (Cancelled)

16. (Currently Amended) A method of screening potential catalysts for polymerization performance wherein the polymerization performance of the potential catalysts is determined for at least a first monomer as a predictor for the polymerization performance of the potential catalysts for at least a second monomer, the first and second monomers being different from each other and the first monomer being an olefin other than ethylene, the method comprising:

concurrently reacting an array of at least 8 potential polymerization catalysts that are different from each other with ~~the~~ at least the first monomer and not the second monomer under polymerization conditions in a first reaction;

determining the polymerization performance of each of the at least 8 potential catalysts reacted with the at least first monomer in the first reaction; and,

identifying one or more catalysts from the at least 8 potential polymerization catalysts based on the polymerization performance of the catalysts in the first reaction; and

reacting the one or more identified catalysts with the first and second monomers under polymerization conditions in a second reaction  
~~using the polymerization performance as a figure of merit for planning of additional screens, laboratory or commercial polymerization or copolymerization.~~

17. (Canceled)

18. (Cancelled)

19. (Original) A screening method according to Claim 16 wherein the step of determining the polymerization performance comprises measuring a characteristic of the reaction products.

20. (Withdrawn) A screening method according to Claim 16 further comprising the step of polymerizing the at least second monomer using the catalyst.

21. (Withdrawn) A screening method according to Claim 20 comprising polymerizing the second monomer in commercial quantities.

22. (Withdrawn) A screening method according to Claim 16 wherein the step of determining the polymerization performance comprises analyzing the polymer using a high throughput chromatography technique.

23. (Withdrawn) A screening method according to Claim 22 comprising analyzing the polymer using size exclusion chromatography.

24. (Currently Amended) A screening method according to Claim 16, wherein the array of potential catalysts comprises a substrate having wells with each of the at least 8 potential catalysts residing in a different well of the substrate.

25. (Currently Amended) A screening method according to Claim 24, wherein the reacting steps further comprises adding other compositions to the wells other than the first or second monomers or the catalysts.

26. (Previously Presented) A screening method according to Claim 24 comprising dispensing the first monomer as a liquid into each reaction vessel that contains one of the potential catalysts prior to the step of reacting the catalyst with the first monomer.

27. (Withdrawn) A screening method according to Claim 24 comprising distributing the first monomer as a gas to each reaction vessel that contains one of the potential catalysts prior to the step of reacting the catalyst with the first monomer.

28. (Previously Presented) A screening method according to Claim 24 further comprising:

activating the potential catalysts; and

wherein at least a portion of the at least first monomer is provided to each reaction vessel prior to activation of the potential catalysts.

29. (Withdrawn) A screening method according to Claim 16, wherein the step of determining the polymerization performance of the catalysts comprises measuring a property of any polymer sample made during the reaction step, wherein the property is selected from the group consisting of molecular weight, polydispersity index, viscosity, concentration, solvent extractables, solubility, melt flow index, glass transition temperature, melting point, percent crystallinity, density, polymer mass, polymer composition, polymer structure, polymer architecture, and combinations thereof.

30. (Original) A screening method according to Claim 16, wherein the determination of polymerization performance comprises measuring a property of the reaction mixture from any members of the array, wherein the property is selected from the group consisting of monomer concentration, monomer conversion, ratio of catalyst to monomer, light scattering, viscosity, temperature, visual inspection, intrinsic viscosity, polymer concentration, molecular weight, and combinations thereof.

31. (Original) A screening method according to Claim 16, wherein the reacting step is carried out to a predetermined point selected from the group consisting of time, monomer consumption, heat of reaction, polymer concentration, viscosity, and molecular weight.

32. (Original) A screening method according to Claim 31 and further comprising quenching the reaction at the predetermined point.

33. (Currently Amended) A screening method according to Claim 16, wherein the reacting step comprises concurrently reacting each of the at least 8 potential catalysts in the array with the first monomer.

34. (Withdrawn) A screening method according to Claim 16, wherein the determination is used as a predictor for the polymerization activity of the potential catalysts for a co-polymerization of the second monomer with a third monomer.

35. (Withdrawn) A screening method according to Claim 34 and further comprising the step of copolymerizing the second and third monomers.

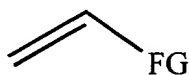
36. (Withdrawn) A screening method according to Claim 35 comprising copolymerizing the second and third monomers in commercial quantities.

37. (Original) A method according to Claim 16 wherein the first monomer is an  $\alpha$ -olefin.

38. (Original) A method according to Claim 37 wherein the first monomer is selected from the group consisting of 1-octene, 1-hexene, 1-heptene, 1-nonene, and 1 decene.

39. (Cancelled)

40. (Withdrawn) A screening method according to Claim 16 wherein at least the first monomer is represented by the formula:



wherein FG is a halogen or a functional group that contains at least one heteroatom.

41. (Canceled)

42. (Currently Amended) A screening method for high throughput screening of potential catalysts for polymerization performance for at least a second monomer, comprising:

concurrently reacting a plurality of ~~at least 8~~ potential catalysts arrayed on a substrate with a first monomer and not the second monomer in a first reaction, the first and second monomers being different from each other and the first monomer being an olefin other than ethylene;

determining a property of any polymer sample or polymerization mixture made during the first reaction at a rate of one hour or less per potential catalyst, ~~and,~~

identifying one or more catalysts from the potential polymerization catalysts based on the properties of the samples from the first reaction; and

reacting the one or more identified catalysts with the first and second monomers under polymerization conditions in a second reaction~~using the determination as a figure of merit for planning of additional screens, laboratory or commercial polymerization or copolymerization.~~

43. (Original) A screening method according to Claim 42 comprising:  
concurrently reacting at least 24 potential catalysts; and  
determining properties at a rate of about 20 minutes or less per potential catalyst.

44. (Withdrawn) A screening method according to Claim 42 wherein the step of determining the polymerization performance comprises measuring a characteristic of the reaction products.

45. (Original) A screening method according to Claim 42 wherein the step of determining a property comprises measuring the concentration of the polymer formed using the catalyst.

46. (Withdrawn) A screening method according to Claim 42 wherein the step of determining a property comprises measuring the polydispersity index of the polymer formed using the catalyst.

47. (Withdrawn) A screening method according to Claim 42 wherein the step of determining a property comprises analyzing the polymer using a high throughput chromatography technique.

48. (Withdrawn) A screening method according to Claim 47 comprising analyzing the polymer using size exclusion chromatography.

49. (Withdrawn) A screening method according to Claim 42, wherein the step of determining a property comprises measuring a property of any polymer sample made during the reaction step, wherein the property is selected from the group consisting of molecular weight, polydispersity index, viscosity, concentration, solvent extractables, solubility, melt flow index, glass transition temperature, melting point, percent crystallinity, density, polymer mass, polymer composition, polymer structure, polymer architecture, and combinations thereof.

50. (Original) A screening method according to Claim 42, wherein the step of determining a property comprises measuring a property of the polymerization reaction mixture from any members of the array, wherein the property is selected from the group consisting of monomer concentration, monomer conversion, ratio of catalyst to monomer, light scattering, viscosity, temperature, visual inspection, intrinsic viscosity, polymer concentration, molecular weight, and combinations thereof.

51. (Withdrawn) A screening method according to Claim 42, wherein the concurrent reactions are carried out to a predetermined point selected from the group consisting of time, monomer consumption, heat of reaction, polymer concentration, viscosity, and molecular weight.

52. (Withdrawn) A screening method according to Claim 51 and further comprising concurrently quenching the reaction at the predetermined point.

53. (Withdrawn) A screening method according to Claim 42, wherein the determination is used as a predictor for the polymerization activity of the potential catalysts for a co-polymerization of the second monomer with at least a third monomer.

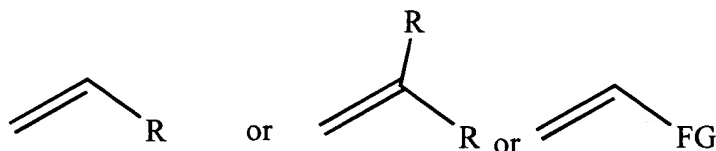
54. (Withdrawn) A screening method according to Claim 53 and further comprising the step of copolymerizing the at least second and third monomers.

55. (Withdrawn) A screening method according to Claim 54 comprising copolymerizing the at least second and third monomers in commercial quantities.

56. (Withdrawn) A method according to Claim 42 wherein the first monomer is an olefin other than ethylene.

57. (Withdrawn) A method according to Claim 42 wherein the first monomer is 1-octene, 1-hexene, 1-heptene, 1-nonene, and 1 decene.

58. (Withdrawn) A screening method according to Claim 41, wherein the first monomer is represented by a formula selected from the group consisting of:



wherein each R is independently selected from the group consisting of halogen, alkyl, substituted alkyl, aryl, substituted aryl, heteroalkyl, cycloalkyl, substituted cycloalkyl, heterocycloalkyl, substituted heterocycloalkyl, heteroaryl, substituted heteroaryl, alkoxy, silyl, boryl, phosphino, amino, thio, seleno and combinations thereof; and FG is halogen or a functional group that contains at least one heteroatom.

Claims 59-69. (Cancelled)

70. (Currently Amended) A method of screening potential catalysts for polymerization performance wherein the polymerization performance of the potential

catalysts is determined for at least a first monomer as a predictor for the polymerization performance of the potential catalysts for at least a second monomer, the first and second monomers being different from each other and the first monomer being an olefin other than ethylene, the method comprising:

concurrently reacting an array of at least 8 potential polymerization catalysts that are different from each other with ~~the~~ at least the first monomer and not the second monomer under polymerization conditions in a first reaction;

determining the polymerization performance of each of the potential catalysts with the at least first monomer in the first reaction; and

polymerizing the first and second monomers as copolymers or higher-order polymers in a second reaction using one of the catalysts in the array based upon the polymerization performance of the catalyst.

71. (Withdrawn) A method of screening potential catalysts for polymerization performance wherein the polymerization performance of the potential catalysts is determined for at least a first monomer as a predictor for the polymerization performance of the potential catalysts for at least a second monomer, the first and second monomers being different from each other and the first monomer being an olefin other than ethylene, the method comprising:

concurrently reacting an array of at least 8 potential polymerization catalysts that are different from each other with the at least first monomer under polymerization conditions;

determining the polymerization performance of each of the potential catalysts with the at least first monomer; and

polymerizing the second monomer with at least one of the at least 8 potential polymerization catalysts.



72. (Withdrawn) The method of claim 71, wherein the at least one of the at least 8 potential polymerization catalysts is selected for polymerization with the second monomer based on its polymerization performance.

73. (New) A screening method according to Claim 16, wherein the polymerization performance of the identified catalysts for the first reaction has a figure of merit for a particular property.

74. (New) A screening method according to Claim 16, further comprising determining the polymerization performance of each of the one or more catalysts reacted with the first and second monomers in the second reaction.

75. (New) A screening method according to Claim 42, wherein the polymer samples produced by the identified catalysts for the first reaction have a figure of merit for a particular property.

76. (New) A screening method according to Claim 42, further comprising determining a property of any polymer sample or polymerization mixture made during the second reaction at a rate of one hour or less per potential catalyst.

### **REMARKS**

Claims 16, 17, 19, 24-26, 28, 30-33, 37, 38, 41-43, 45, 50 and 70 were considered in the Office action. Claims 16, 19, 24-26, 28, 30-33, 37, 38, 42, 43, 45, 50, 70 and 73-76 are now pending in the above-referenced patent application. Applicants respectfully request further consideration of these claims, in view of the amendments set forth above and the following remarks.

### **Cancelled Claims**

Claims 17 and 41 have been cancelled to advance the prosecution of the instant case. Applicants expressly reserve the right to refile the cancelled claims, without prejudice, in a

continuing application. Applicants' cancellation of these claims should not, in any way, be considered as an admission with respect to any outstanding rejections applying to such claims, and Applicants hereby expressly deny any such interpretation. Likewise, Applicants cancellation of these claims should not, in any way, be considered as a surrender of any subject matter covered by the cancelled claims or any equivalents thereof, and Applicants hereby express their intent to pursue patent coverage for such subject matter and equivalents thereof.

Applicants have not cancelled claims 20-23, 27, 29, 34-36, 40, 44, 46-49, 51-58, 71 and 72 and request that the Examiner consider them upon allowance of a generic claim.

#### Amended Claims

Claims 16, 25, 42 and 70 have each been amended to clarify what Applicants regard as their invention. Specifically, these as-amended claims define a first reaction and expressly require a second reaction, and clarify that the second monomer is reacted (*e.g.*, polymerized) in the second reaction, but is not reacted in the first reaction. Support for these amendments can be found throughout the specification, including for example at page 4, line 28 – page 5, line 3, page 38 line 18 and original claim 17.

By amending the application, the Applicants do not concede that the patent coverage available to them would not extend as far as the original claims, and in this case different language is being used to claim identical subject matter. Also, Applicants reserve the right to file a continuation application to pursue the original claims as filed. Applicants believe that the Examiner has not made a sufficient showing of indefiniteness or of obviousness of the teachings of the asserted prior art, especially given the lack of teachings in the cited references of the steps that Applicants have recited in their claims.

By the present amendment, it does not follow that the amended claims have become so perfect in their description that no one could devise an equivalent. After amendment, as before, limitations in the ability to describe the present invention in language in the patent claims naturally prevent the Applicants from capturing every nuance of the invention or describing with complete precision the range of its novelty or every possible equivalent. See, *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 62 USPQ2d 1705 (2002). Accordingly, the foregoing amendments are made specifically in the interest of expediting

prosecution and there is no intention of surrendering any range of equivalents to which Applicants would otherwise be entitled.

No new matter has been added.

#### New Claims

New claims 73-76 have been added to claim certain preferred embodiments of the invention. Support for these claims can be found throughout the specification, including for example at page 38, line 17-18.

No new matter has been added.

#### Response To 112 Rejections

Claims 16, 17, 19, 24-26, 28, 30-33, 37, 38, 41-43, 45 and 50 stand rejected under 35 U.S.C. § 112 as allegedly being indefinite and as failing to meet the written description requirement. Applicants traverse these rejections.

#### Indefiniteness

Independent claims 16 and 42 were rejected as allegedly indefinite. The Office action alleges that the phrase “using the polymerization performance as a figure of merit for planning. . .” as used in claim 16 and “using the determination as a figure of merit for planning. . .” as used in claim 42 are confusing and render the claim indefinite and are relative because they do not indicate how the information is to be used or the value of the “figure of merit”.

Applicants have amended claims 16 and 42, thus obviating the indefiniteness rejections for these claims as to the steps of using the determination for planning.

Applicants have nonetheless added new claims 73 and 75, claim 73 requiring that the polymerization performance for the identified catalysts in the first reaction has a figure of merit for a particular property, and claim 75 requiring that the polymer samples produced by the identified catalysts for the first reaction have a figure of merit for a particular property . To the extent that the phrase “figure of merit” still raises any indefiniteness concerns, Applicants submit the following remarks.

The Office action has asserted that a person of ordinary skill in the art wouldn't know whether or not they infringe this claim. Since the words have a plain meaning, and this meaning is known to a person of skill in the art, they know whether or not they infringe. A figure is defined as "a value" *Webster's Ninth New College Dictionary*, 461 (1985) and merit is defined as "individual significance" *Id.*, at 743. A figure of merit therefore generally means a value of individual significance.

One of ordinary skill in the art (a combinatorial chemist versed in olefin polymerization) would understand what it means for a performance of a catalyst candidate or a polymer sample made by a catalyst candidate to have a figure of merit for a particular property. This is supported by the Declarations of Dr. Jordan and Dr. Murphy provided earlier, which have not been refuted with evidence from the Patent Office. "[T]he figure of merit is the value associated with the particular property being measured for comparison to a threshold performance." *Murphy Declaration*, Paragraph 5. "The results of the polymerization reactions, whether they be polymerization performance of the catalyst or a property of the polymer sample, have to overcome a certain threshold before the catalyst will be further considered for additional experimentation. Thus, the figure of merit is the particular property being measured for the threshold performance for the catalyst to advance in the process." *Jordan Declaration*, Paragraph 9. "The threshold of performance is determined by the experiment designer and is typically set sufficiently high so that many catalysts do not meet that performance (effectively thus screening the catalysts, i.e., throwing some out and proceeding with others)." *Jordan Declaration*, paragraph 9; *Murphy Declaration*, Paragraph 5. As such, the actual value for the figure of merit can be different depending upon the particular property being evaluated, the reaction components, the desired end products, etc.

In addressing the argument that a certain threshold or hurdle must be overcome for a catalyst candidate to pass on to further testing, the Office action states that "it is the subjective and relative nature of the determination which may vary from one experimenter to the next that renders the claim indefinite." See Office action, Page 6.

While the figure of merit may vary from one experiment to the next experiment, that does not make the claim indefinite. The value for the figure of merit is set for a particular experiment – e.g., by the investigator to evaluate the catalyst / resulting polymer - with

respect to a property of interest. Hence, a person of skill in the art knows whether or not there is a figure of merit value for a given experiment. Accordingly, a person of skill in the art would understand whether or not they infringe.

Further, the fact that the figure of merit value can change depending on the experiment goals does not require Applicants to disclose or claim specific value(s) for a figure of merit for a property of interest. A person of ordinary skill in the art of olefin polymerization is well versed in what values are of interest for particular properties for a given experiment. This is the quintessential knowledge of a polymer scientist.

Nonetheless, the Office action states in this regard that, “[w]ithout knowing a priori the hurdle or precise means of determining the hurdle/threshold, one of ordinary skill in the art (e.g. a combinatorial chemist) would not be appraised as to whether he/she is or is not infringing.” Applicants respectfully submit that this assertion is unfounded in both law and fact.

As noted above, one of ordinary skill in the art would know if they were infringing because they know if they select a value as a figure of merit, and they know if they use that value as required by the claims. With respect to setting a particular number value as the figure of merit, the person of ordinary skill in the art does not operate in a vacuum. Rather, a given experiment is run to achieve a particular scientific objective, typically defined by the scientist and/or by a commercial need. The elements of choosing better performing catalysts and conducting them to further reaction is a result of a potential catalyst having a figure of merit and identifying those potential catalysts having a figure of merit for a particular property. A combinatorial chemist versed in olefin polymerization who would screen catalysts in the manner defined in the claims will know if they are infringing the claim, despite the exclusion of a precise value being claimed. The phrase is broad with respect to particular values, but this phrase is in no way indefinite. To the extent that the Examiner is concerned that the term “figure of merit” is broad, Applicants note that the breadth of a claim does not make it indefinite. *See In re Gardner*, 166 USPQ 138 (CCPA 1970).

The Applicants’ position in this regard is well supported by case law. In particular, the Federal Circuit has provided legal guidance that demonstrates that even terms which can be relative to a particular application of an invention are not indefinite. For example, in *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 1 USPQ2d 1081 (Fed. Cir. 1986), the court

held that a claim limitation requiring that a part of a wheelchair be “so dimensioned as to be insertable through the space between the doorframe of an automobile and one of the seats” was not indefinite.

The phrase “so dimensioned” is as accurate as the subject matter permits, automobiles being of various sizes. . . . As long as those of ordinary skill in the art realized that the dimensions could be easily obtained, § 112 ¶ 2 requires nothing more. The patent law does not require that all possible lengths, corresponding to the spaces in hundreds of different automobiles be listed in the patent, let alone that they be listed in the claims.

*Id.* at 1088. *See also, Moore U.S.A., Inc. v. Standard Register Co.*, 56 USPQ2d 1225, 1239 (Fed. Cir. 2000)(quoting *Orthokinetics*; “there is nothing wrong with defining the dimensions of a device in terms of **the environment in which it is to be used.**”)(emphasis added); *Bausch & Lomb Inc. v. Alcon Laboratories Inc.*, 53 USPQ2d 1353 1355 1356(W.D. N.Y. 1999) (“The focus, then, is whether, given the **nature of the subject matter**, the claim is precise enough to make clear to a person of skill in the art what is claimed. There may be times when, for one reason or another, it is impossible, **unnecessary, or undesirable** to state a claim in terms of precise, quantified measurements.” (emphasis added); and “Not every claim must be expressed in terms of specific numerical values; rather, **the degree of precision with which the claims must be stated to meet the definiteness requirement ‘is a function of the nature of the subject matter.**”)(emphasis added) (Quoting *Miles Labs., Inc. v. Shandon Inc.*, 27 USPQ2d 1123 (Fed. Cir. 1993)).

Applicants respectfully submit that the claims are definite in light of the nature of the subject matter and the environment in which the subject matter is used. In the instant application, the invention is directed to protocols useful for screening potential catalysts for polymerization (*e.g.*, to form co-polymers or higher-order polymers) in which at least one monomer is an olefin other than ethylene. Such protocols are clearly described in the Specification, for example at page 38, lines 10-20:

The term “screening,” including “primary screening” and “secondary screening,” is used herein in its broadest sense to refer to a technique that identifies one or more desired properties of a library member. In combinatorial chemistry, screens are often used successively to identify progressively smaller or more focused groups of libraries that include more of

the desired properties (quantitatively, qualitatively, or both) than do others of the screened group. For example, a primary screen may be used to test 5000-50,000 catalyst candidates for a particular property, and may identify 20-100 of the candidates as having the figure of merit as set by the primary screen.

Those candidates can be tested in a secondary screen to identify candidates that appear to have superior properties or (in the case of catalysts) produce superior results. This small number of "lead candidates" are then developed and studied in the greatest detail.

(emphasis added). The Specification is quite clear that in the context of the subject matter of this invention, catalyst candidates showing more desirable properties in a first reaction can be identified by evaluating whether candidates have a figure of merit for a particular property. One or more of those candidates which have (or exceed) the figure of merit can be investigated further in a second reaction.

Thus, Applicants respectfully submit that a person of ordinary skill in the art would understand whether or not they infringe the inventions as defined by the claims as amended, as well as by the new claims. Therefore these claims are definite, and Applicants request that the instant rejections be withdrawn.

#### Written Description

Claims 16, 17, 19, 24-26, 28, 30-33, 37, 38, 41-43, 45, 50 and 70 stand rejected under 35 U.S.C. §112, 1<sup>st</sup> paragraph, as containing subject matter which was not described in such a way as to reasonably convey to one of skill in the art that Applicants were in possession of the claimed invention. Specifically, the Office action states that certain aspects of the invention are broadly defined (*e.g.*, prediction and planning steps), and asserts that the disclosure does not support the claimed genus or substantial portion thereof, and is therefore inadequate to show possession of the invention.

While Applicants do not agree with the basis of the rejection, in order to advance prosecution, Applicants have amended claims 16 and 42 and 70. It is believed these amendments obviate the written description rejection. Thus, Applicants respectfully submit that the rejection is moot.